Samsung Enterprise SSD 2013

Samsung OEM offering		PM843			SM843			SM843T				SM1625			
Availability		Feb 13			now			Feb 13; 960GB: March 13				on request			
Interface		SATA 6.0Gbps			SATA 6.0Gbps			SATA 6.0Gbps				SAS 6G Dual port			
Target Application		Read intensive, <10% Write content & Streaming Servers, Low cost, Sequential Read Performance			20-30% write Boot Drive / Scratch Drive, Meta data (HPC), Web server, Random read perfromance			40-50% write extensive read and Write cache , Data warehousing, high edurance optimized				60-70% write Tier 0, Storage servers			
recommendations for design-in		**perferct cost sensitive, entry level, Low endurance, High rentention**			Mid range endurance, High rentention, low latency			**a perfect trade-off between cost and edurance; MLC based SSD with Storage Firmware**				high Endurance and high performance			
Part numbers		MZ7TD120HAFV-000DA	MZ7TD240HAFV-000DA	MZ7TD480HAGM-000DA	MZ7PD120HAFV-000DA	MZ7PD240HAFV-000DA	MZ7PD480HAGM-000DA	MZ7WD120HAFV-00003	MZ7WD240HAFV-00003	MZ7WD480HAGM-00003	MZ7WD960HAGP-00003	MZ6ER100HAFV-00003	MZ6ER200HAGM-00003	MZ6ER400HAGL-00003	MZ6ER800HAGL-00003
Capacities		120 GB	240 GB	480 GB	120 GB	240 GB	480 GB	120 GB	240 GB	480 GB	960 GB	100 GB	200 GB	400 GB	800 GB
relative price ball park per GB		100%			113%			138%				338%			
Retention virgin SSD / by guaranteed endurance		10 years / 3 months			10 years / 3 months			10 years / 3 months				10 years / 3 months			
Warranty (logical OR) [A]		3 years OR TBW			5years OR TBW			5years OR TBW				5years OR TBW			
TBW (Total Bytes Written) allowed 1) 100% 64KB Seq. Write		207 TB	415 TB	830 TB	1 PB	2 PB	4 PB	2 PB	4 PB	8 PB	16 PB	4 PB	8 PB	16 PB	24 PB
2) 100% 4KB Rand. Write[2)] 3) 100% 8KB Rand. Write		52 TB[2)]	105TB	210TB	250 TB[2)]	500 TB	1 PB	500 TB[2)]	1 PB	2 PB	4 PB	1.8 PB[3)]	3.5 PB	7 PB	10 PB
estimated allowed TBW per day for a life time of 3 years:	Seq. Write @ 64KB	207 GB	415 GB	830 GB	1 TB	2 TB	4 TB	2 TB	4 TB	8 TB	16 TB	4 TB	8 TB	16 TB	24 TB
	Ran. Write @ 4KB	52 GB	100 GB	210 GB	250 GB	500 GB	1 TB	500 GB	1 TB	2 TB	4 TB				
	Ran. Write @ 8KB											1.8 TB	3.5 TB	7 TB	10 TB
WPD random / Sequencial write (work load per day) [D]		0.6 / 2.5 @3 years			1 / 4 @ 5 years			2 / 8 @ 5 years				5 / 12 @ 5 years			
Latency Random Read/ write		0.28 ms/ 0.11 ms			0.13 ms/ 0.08 ms			0.13 ms/ 0.08 ms				-			
Controller		MDX (SATA 6.0G)			MDX (SATA 6.0G)			MDX (SATA 6.0G)				RDX (SAS Dual Port: 12.0G)			
NAND		21nm 64Gb TLC			21nm 64Gb MLC			21nm 64Gb MLC				21nm 64Gb Ep-MLC			
Form Factor		2.5" (7mm thickness)			2.5" (7mm thickness)			2.5" (7mm thickness)				2.5"(15mm thickness)			
Data -loss Protection		None			None			Yes, Tantal Cap				Yes, Super Capacitor			
Over-Provisioning		7%			7%			7%				28%			
Smart ID read out and setting Magician Tool Windows & Linux		Yes			Yes			Yes				None			
Power Target Typ. (Active Write) / Min. (idle)		3.6W / 0.3W			3.4W / 0.3W			3.0W / 0.3W				9W / 4W (5V +12V)			
Performance	Seq. Read / Write [B] @64k	520 / 330 MB/s			530 / 420 MB/s			500 / 400 MB/s				@ 128KB: Single Port : 497 / 435 MB/s Dual Port : 902 / 740 MB/s			
	Ran. Read @4k	60KIOPS(TBD)			70 KIOPS			60 KIOPS				@4KB: Single Port : 72 KIOPS Dual Port : 101.5 KIOPS 8KB: Single Port: 50 KIOPS Dual Port: 81 KIOPS			
	Ran. Write [C] @4k	1.5/2.5/2.5 KIOPS			8.5 / 11.5 / 11.5 KIOPS			5.5 / 11 / 11 / 11 KIOPS				@4KB: Single / Dual Port : 30 KIOPS / 60KIOPS @8KB: 90 / 150 KIOPS			

SSD vs. HDD: Smart ID & Life cycle The key advantage of SSD is its feature of having a forecastable life cycle. Lacking mechanical parts, its life cycle depends strongly on writing of data which can be tracked by electrical commands, the so-called SMART IDs. Our Magicin Tool for both windows and Linux platforms support you to track the amouth of data you write on SSD. If you track this over a period of time in your environment, the extrapolation will provide you with an exact figure of the life cycle of your SSD. the TBW figures should provide you an overview of expected life cycle.

Retention: Retention refers to the time that the cells in SSD are capable of keeping the data before a refresh needs to take place. virgin SSD has up to 10 years retention based on the behavior of Flash cell built upon. The more the Flash cell are written, the higher the cell wears off and and the leakage current increases.by the consumption of TBW the retention declines to ~3 months.

Endurance / life cycle: SSD is based on NAND Flash cells. The writting of cells is a destructive process. The more the cell is written the more the cell is damged. The leakage current increases, retention decreases. If the SSD and so the cells are connected to power 24/7 as in the case of server implementation could be assumed, the firware of SSD could be adjusted on increasing endurance, while the refresh of cells can be adjusted.

SSD approach recommendation:
1) Pre-selection based on needs on TBW and GB writes per day and targte application guide
2) Perform a proof of concept
3) Implement concept in bigger scale
4) Keep monitoring the smart IDs

Over-provisioning: The amount of the data intented to be written on SSD is not the same amount of data written on SSD. The background is mainly the basic characteristics of Flash. Writing is done page-wise, but deleting happens on a block. Any SSD needs free blocks to be able to write effectively. A designated physical area of the SSD which is not used for logical data allocations, called over-provisioning, helps the controller to allow for a broader write bandwidth. the higher the over-provisioning the better the write perfromance, witha trade-off of losing blocks for physical data.

Virgin SSD / Preconditioning: a virgin SSD has a very high write bandwidth. As soon as all cells are written to once, the bandwidth decreases partially dramatically. Hence, before testing and evaluating SSD performance, make sure to have written to all cells once. This is called preconditioning of an SSD to get sustained results.

SSD as HDD replacement? SSD is not a direct HDD replacement. The writing behavior of your application is key to a right choice of SSD. Check the TBW figures and the calculated total GB per Day values to a get a feeling on each SSD capabilities. The bandwidth and perfromance is the 2nd aspect to look into, and last the latency.

TBW: Total Bytes Written is a key parameter for SSD. The data is provided above for the life cycle and a guidance of total GB per day. Nothing is more critical to SSD than the write behavior of your application.

A TBW figures are prelimianry, and will be updated by the end of the year 2012, subject of change, please ask your Samsung sales representative for the latest information
B sustained (after pre-conditioning) 100% 4KB random write IOPS 24 hrs x 7 days x 365 days
C the higher the SSD density the higher the the write performance, the "up to" value refers to this aspect and reflects the performance of the highest density
D Number of time that SSD capacity could be writteb in Random Writes per day for the specified period time given till TBW is consumed

all data are subject to changes without notice, please conatct Samsung channel partner in your region for latest update

Samsung SSD activated

Samsung DDR3 DRAM offering for Server : Green memory, Generation 2 (G2 = 30nm class)

Target Application	ECC REG (standard height)	Density	Rank	nominal speed and voltage: Speed	nominal speed and voltage: Voltage	Syteme Behavior, Intel Xeon E5 max. population: DIMM/Channel: 1600@1.35V	1600@1.5V	1333@1.35V	1333@1.5V	1066@1.35V	1066@1.5V	800@13.35V	800@1.5V	Base Component	Technology Node	Power consumption at 100% loading*	Power consumption at idle *	Part Number
HPC, Cloud 2 & more socket servers, normal height of min. 1U, no foot-print and space limitations	for max. 2TB in Westmere-EX 4 socket; needs 64 units, runs at 800; adpot Load reduced DIMM Modules fro Sandybridge 4 socket boards	32GB	4	1333	1,35	-	-	I	-	-	II	-	III	4Gb	30nm	12W	4.0W	M393B4G70BM0-YH9
	Push product, highest flexibility , parity reached with 2x8GB	16GB	2	1600	1,35	I	II	II	II	II	III	-	-	4Gb	30nm	6.4W	2.4W	M393B2G70BH0-YK0
	Mainstream, highest volume and availability;	8GB	2	1600	1,35	I	II	II	II	II	III	-	-	4Gb	30nm	2.6W	1.1W	M393B1G73BH0-YK0
	Legacy product, to maximize bandwidth in small memory configurations, e.g. 12GB per Intel Xeon E5 2400 CPU	4GB	2	1600	1,35	I	II	II	II	II	III	-	-	2Gb	30nm	3.4W	1.0W	M393B5273DH0-YK0
	Load Reduced																	
BIG DATA, In-Memory , mainly for 4 & more socket servers, mainly 3 DPC, high density while keeping up memory bandwidth	Only for Ivybridge platform	64GB	4	1333	1,35	-	-	I	II	III	III	-	-	4Gb	30nm	25W	11.6W	M386B8G70BO0-YH9
	Small adder vs. normal REG DIMMs. It makes sense for usage of starting 2 DPC or higher population, due to higher bandwidth. Please note: slightly higher power consumption than RDIMM	32GB	4	1600	1,35	I	-	-	II	III	III	-	-	4Gb	30nm	13W	5.8W	M386B4G70BM0-YK0
	16GB RDIMM is a more preferred part.	16GB	4	1600	1,35	I	-	-	II	III	III	-	-	4Gb	30nm	6.7W	3.4W	M386B2K70DM0-YK0
	ECC UNB / ECC UNB SO-DIMM																	
Dedicated server, Hosting 1 socket systems, 1600 speed is not needed.	**ECC UNB SODIMM** : Not a standard product. Project-based support, close alignment with Samsung sales required	8GB	2	1600	1,35	-	-	II	-	-	-	-	-	4Gb	30nm	2.7W	1.1W	M474B1G73BH0-YK0
		4GB	2	1600	1,35	-	-	II	-	-	-	-	-	2Gb	30nm	2.5W	1.0W	M474B5273DH0-YK0
	ECC UNB : Standard Product	8GB	2	1600	1,35	-	-	II	-	-	-	-	-	4Gb	30nm	2.7W	1.1W	M391B1G73BH0-YK0
		4GB	2	1600	1,35	-	-	II	-	-	-	-	-	2Gb	30nm	2.5W	1.0W	M391B5273DH0-YK0

Speed compatibility:
1600 speed is downward compatible with 1333, 1066 and 800. The speed is automatically identified by system BIOS and adjusted in the system based on the number of DIMMs per Channel (DPC). The speed adjustment is explained in the table above for each module category. Beyond the system adjustments, some platforms offer the option of speed enforcing with BIOS to a desired level (normally lower).

Voltage compatibility:
1,35V modules are upward compatible with 1,5V. i.e. a 1.35V Module will also work with a 1.5V setting. Many systems of INTEL EPSD, Supermicro etc allow the users to enforce and adjust the memory voltage on BIOS level. In this sense it is advisable to source 1.35V modules since they allow you to use them also at 1.5V. The voltage is automatically identified by the system BIOS and adjusted in the system based on the number of DIMMs per Channel (DPC).

Sourcing recommendation:
In order to reduce the amount of part numbers, consequently reducing the inventory level and increasing the flexibility, Samsung recommends to generally use the 1600 1.35V parts. These parts come with no adder or premium to other voltage and speed options, and they are downwards compatible through BIOS setting to the desired speed and voltage seeting of your application. (coampare with the table on the right)

Process Technology :
The lower the number the more features come with the parts. 1600 speed in combination with 1,35V is the main output of 30nm technology. That is why Samsung does not ask for a premium. And we recommend to focus on one part number per product density to reduce the inventory, easier planning and importing to different plaforms and applications.

you can recognize ess technology on the modues you use with hints on the Module sticker.
G2 = 30nm; stands for Generation 2 of Samsung Green Products

1600/1.35V RDIMM fits all

DIMM speed and Volatge			System speed and voltage				
DPC config.	or pre installed DIMM	added DIMM as upgrade	1600/1.35V	1600/1.5V	1333/1.35V	1333/1.5V	1066/1.5V
1 DPC	1600/1.35V	N.A.	(x)	(x)	x		
2DPC	1600/1.35V	1600/1.35V	(x)	(x)	x		
2DPC	1600/1.5V	1600/1.35V		(x)		x	
2DPC	1333/1.35V	1600/1.35V			x	(x)	
2DPC	1333/1.5V	1600/1.35V				x	
2DPC	1066/1.35V	1600/1.35V					x

Sandybridge 2 socket system
X = the setting adjusted in system automatically without BIOS setting changes
(x) = BIOS Option, BIOS setup of manufacturer; available on INTEL EPSD and supermicro boards BIOS